ACCESS, ISSUES AND MITIGATION

REPORT

for

EDP

PROPOSED WIND TURBINE INSTALLATION

at

LAND EAST OF BEMERSLEY ROAD,

BEMERSLEY GREEN

carl TONKS consulting

CONTENTS

Client:		EDP	
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1. INTRODUCTION

1.1 **carl TONKS consulting** is commissioned by EDP to investigate practical issues of construction vehicle access associated with its proposal to install a wind turbine at Land East of Bemersley Road, Bemersley Green in the county of Staffordshire.

1.2 This report has been compiled following discussion with officers of the local highway authority, Staffordshire County Council and visits to the site of the proposed development in order to observe and photograph the geometry and operation of the local highway network. Thus an appropriate base of information has been compiled to enable thorough consideration of relevant access issues, including a detailed review of matters of interest to highways development control officers of the local highway authority.

1.3 This report is structured such that;

- **Chapter Two** will discuss the site location and characteristics, geometry and observed operation of the local highway network, including matters identified in discussion with local highway officers;
- **Chapter Three** identifies the development proposals;
- **Chapter Four** will describe the kind and number of vehicles required to install the proposed wind turbine including relevant characteristics, particularly size;
- **Chapter Five** identifies proposals for accessing the site from the adjacent highway;
- The proposed route(s) for construction vehicles to reach the site is discussed in **Chapter Six**;
- Issues arising on the preferred route are identified in **Chapter Seven**;
- **Chapter Eight** develops mitigation for issues identified; and,
- **Chapter Nine** draws conclusions from the observations and analyses presented in this report.

2. SITE LOCATION AND LOCAL HIGHWAY NETWORK

2.1 Site Location

2.1.1 The location of the proposed wind turbine installation is illustrated in a figure titled Site Location, produced by one associates and included herewith as **Appendix A**. The site is situated on land to the east of Bemersley Road, Bemersley Green in the county of Staffordshire.

2.2 Local Highway

2.2.1 The proposed development site lies in a rural location and the standard of local highway geometry is commensurate with this. The site is situated opposite properties to the south of the village of Bemersley Green, which is between Stoke on Trent and Biddulph.

2.2.2 Adjacent to the site, Bemersley Road heads in a broadly north-south alignment and is of width 5.4m. In the vicinity of the site, horizontal alignment of Bermersley Road is generally straight and vertical alignment in this immediate area is fairly flat. Visibility in both directions is excellent.

2.2.3 The site is currently accessed via an agricultural gateway which is of width 4.0m. Opposite this gateway are a number of residential properties and some 16m north of the existing site access is a three-arm priority junction from which Peck Mill Lane heads in a broadly westerly direction. Peck Mill Lane connects Bemersley Road to Outclough Road/Biddulph Road (A527) over a distance of around ⅓ of a mile.

2.2.4 Peck Mill Lane is narrow, typically around 3.0m in width, widening to 3.5m on approach to Bermersley Road. Vertical and horizontal alignment of Peck Mill Lane are both poor, exhibiting tight radius bends, steep inclines and a low standard bridge crossing a local stream. Photographs of Peck Mill Lane are included as **Appendix B**.

2.2.5 Heading north from the site access location, Bemersley Road passes through the hamlet of Bemersley Green, where a small number of residences are located on both sides of the road. Carriageway width of Bemersley Road narrows slightly, to typically 5.0m and bus stops exist in both directions. No segregated footways are evident, although hard strips exist on both sides adjacent to the houses. These appear to be used as effective footways, albeit frequently blocked by parked cars. Despite the majority of the houses in Bemersley Green apparently having off-road car parking spaces, a number of vehicles are seen to park on the highway.

2.2.6 Continuing further north from Bemersley Green, Bemersley Road exhibits a gentle double-bend before passing and giving access to a waste management and recycling centre and this generates visits by a substantial number of large and heavy vehicles. A short distance further north Bemersley Green turns left onto the minor arm of a three arm priority junction. The continuation of the northbound alignment is known as Childerplay Road. Carriageway width of Bemersley Road, north of the waste and recycling centre and Childerplay Road is of the order of 7.0 to 7.5m. This is clearly appropriate to cater for movements by heavy vehicles associated with the recycling centre.

2.2.7 From its junction with Childerplay Road, Bemersley Road is of straight horizontal alignment. Vertically it climbs from A527 (Tunstall Road) towards Childerplay Road. Other than at its junction with Childerplay Road, carriageway width of this section of Bemersley Road varies between 5.5m and 7.0m. On approach to its easternmost terminal junction, Bemersley Road flares considerably in width and the obtuse angle at which it joins Childerplay Road eases the manoeuvres of large vehicles in the direction of the waste recycling centre and beyond, towards the proposed turbine location. The give-way line at this junction measures 46m.

2.2.8 At its western end, Bemersley Road joins with A527 Tunstall Road by means of a three-arm priority junction at an acute angle (for northbound traffic). The Bemersley Road bellmouth is of generous proportion, the give-way line measuring 21m. In the vicinity of the junction, Tunstall Road is some 8.4m in width.

2.2.9 From Tunstall Road, Bemersley Road climbs initially steeply before levelling in the vicinity of Childerplay Road. Photographs of Bemersley Road, including its junction with Tunstall Road, are included as Appendix C.

2.2.10 South of its junction with Bemersley Road, Tunstall Road is typically 8.0 to 8.5m in width. A little over ¾ mile south is a three arm roundabout junction giving access to a nearby Enterprise Centre. Both A527 entries to this junction are provided with two entry lanes of substantial width. The northbound movement is of large radius bend with little entry deflection and substantial circulating carriageway.

2.2.11 To the south-west of the Enterprise Centre, A527 is known as Biddulph Road and is of width typically 7.5 – 8.0m. Much of Biddulph Road is provided with central hatching and a number of pedestrian islands are provided. The first of these (when heading southbound) is located adjacent to the end of Cumberbatch Avenue, where a significant pedestrian refuge is provided. Passing this in a northbound direction, Biddulph Road is provided with a minimum lane width of 3.6m kerb to kerb. The pedestrian refuge contains illuminated Keep Left bollards, which are located 1.4m from the kerbed edge of the refuge. In the nearside verge, streetlamp columns are positioned 1.75m from the kerb-line, although plastic bollards are positioned 0.4m from the kerb-line, resulting in a minimum over-sail clearance of 5.4m (0.4m + 3.6m + 1.4m).

2.2.12 Heading further to the south-west, other pedestrian crossings are provided in the form of pedestrian D-islands. In each case, minimum lane widths (kerb to kerb) passing in a northbound direction are 3.65m, with a further 0.75m oversail available to the illuminated Keep Left bollards.

2.2.13 The three-arm junction of Biddulph Road with Oxford Road is provided with traffic signal control and caters for pedestrian crossing by means of signal controlled facilities on all arms. Minimum kerb to kerb widths of 3.65m are maintained past the pedestrian islands and a degree of oversail is available, albeit requiring careful management of prdestrians in order to ensure road safety is maintained.

2.2.14 From the vicinity of the Oxford Road junction Biddulph Road climbs in a south-westerly direction to the roundabout junction with High Lane (A5272), which is located on the crest of a significant hill. Circulating carriageway at this junction is of generous width, particularly for eastbound movements for which deflection is not severe.

2.2.15 Continuing in a south-westerly direction, A527 forms an effective northern and western bypass to Tunstall. It is recently constructed and to a high standard, with typical carriageway widths of 10.0m. A further six roundabout junctions are encountered on A527 before reaching a grade separated interchange with the A500. These roundabouts are all of large Inscribed Circle Diameter (ICD) and provide two wide entry lanes along with generous exit widths. A527 alternates between wide single carriageway (10.0m wide) and dual two lane carriageways throughout this stretch. Photographs of A527 are included as Appendix D.

2.2.16 A500 is wide dual two lane carriageway with grade separated interchanges to its junction with the M6 Motorway (J16).

3. DEVELOPMENT PROPOSALS

3.1 The proposed development comprises the installation of a single wind turbine and associated ancillary infrastructure on farm-land east of Bemersley Road, Bemersley Green.

3.2 The turbine manufacturer and model will be selected following a competitive procurement process should planning permission be granted subject to it being of a maximum height to hub of 50 metres and maximum height to blade tip of 78 metres (both figures agl).

3.3 There are a range of turbines available within the market place with these design parameters and for the purposes of this assessment the Emergya Wind Technologies (EWT) Directwind 52/54 500kW turbine has been selected as a representative example. This equipment is available in different configurations and in order to ensure robustness it is assumed for the purpose of this assessment that the maximum size configuration could be used. For the purpose of AutoTRACK analyses therefore, the maximum size of 76m hub height and 102m blade tip has been assessed. For practical purposes, smaller turbine configurations including that proposed for this site have similar transport implications, save for a reduced number of AIL vehicles; a 76m tower is delivered in three component lengths, whilst 50m towers or smaller are delivered in two component lengths, hence each component requiring to be transported is of similar length.

3.4 Delivery vehicle types, sizes and numbers associated with the representative turbine are discussed in Section Four of this report, below.

4. CONSTRUCTION TRAFFIC VOLUMES AND CHARACTERISTICS

4.1 Erection of a wind turbine requires transport of various components to the construction site, some of which are available in a form which can be transported using “normal” heavy goods vehicles (HGV), whilst others are of a size and/or weight which require to be transported as AIL. Typical component deliveries associated with transporting construction components for an example EWT 52 / 54 turbine are identified below. In addition to these, further requirements include;

- mobile crane;
- transport of foundation material (hardcore and ready-mixed concrete) to the site; and,
- transport of excavated material from the site.

4.2 Other than the mobile crane, which is required once per site, the numbers of vehicles associated with the other functions above vary from site to site and will become clear following ground investigations further to grant of planning permission. For the purpose of informing the consideration of the planning application, however, typical indicative vehicle numbers are quoted below;

- removal of earth and delivery of concrete typically result in a combined total of some 32 movements (16 vehicles in and out) per turbine;
- earth removal is typically undertaken using rigid tipper trucks;
- concrete deliveries are by ready mixed concrete trucks;
- excavation occurs immediately prior to foundation construction;

- foundations are typically poured in a single day;

- export of excavated material and import of foundation material is typically complete within a period of up to around 5 days maximum;

- goods vehicle movements within this 5 day period typically peak at around 10 – 12 vehicle movements per day (5 – 6 in and a further 5 – 6 out).

4.3 In addition to the above are the AIL deliveries associated specifically with the turbine. These are as defined in paragraph 4.7, below.

4.4 The crane is clearly required in addition to the above and represents a single arrival at commencement of the erection process, followed by a departure following construction.

4.5 Assuming agreement can be reached with the relevant highway authorities, components for a single turbine are typically delivered within one to two days.

4.6 **Appendix E** comprises EWT Directwind 52 / 54 Transport, Storage and Crane Guidelines and confirms the number, size and weights of vehicles required to deliver construction components for erection of this representative turbine.

4.7 Of specific relevance to the delivery of turbine components is the following breakdown of sizes of the larger construction components;

- **Blades**; length 25.8m (to 26.2m including transport packaging). Blades are packaged three to a vehicle, therefore only a single vehicle is required per turbine;

- **Tower sections** (x2 for 50m hub height, x3 for 76m hub height); max length 23.76m (top section), max diameter 3.96m (bottom section). The most onerous load for transport purposes is the bottom section, due to presenting the maximum width, combined with a length of 23.70m;

- **Generator**; diameter 5.7m. Generally transported in a horizontal position, there is the option of raising this component into a vertical position for short distances, in order to address a specific constraint. This is, however, a costly exercise and should only be considered once other options have been discounted.

4.8 The above components are transported as Abnormal Indivisible Loads (AIL).

4.9 The turbine components will be delivered by means of the following numbers of vehicles;

- **Tower components** x3; (three vehicles for the larger vehicle assessed)
- **Anchor**; (single vehicle)
- **Nacelle**; (single vehicle)
- **Hub**; (single vehicle)
- **Generator** (single vehicle); and,
- **Blades** x3 (all carried on a single vehicle).

4.10 The above confirms a total of eight construction component delivery vehicles. These will travel in convoys, the frequency and lengths of which will reflect on-site working programmes and agreements with the relevant highway authorities.

4.11 On-going operational traffic demand associated with a single turbine installation is nominal only. This typically comprises monthly visits to monitor and maintain the turbine equipment an occasional visits for repair. Typically these visits are undertaken by a maintenance engineer in a car or small van and have no material impact on the highway or traffic conditions.

4.12 Further AIL deliveries are limited only to new blade deliveries in the case of a catastrophic failure of the fitted equipment. These are extremely rare and further discussions would be held with the LHA in the unusual circumstance that such an event should occur.

5. SITE ACCESS ARRANGEMENTS

5.1 Requirements for accessing the proposed development site by abnormal vehicles of the kind required to facilitate the erection of an example turbine (EWT DW52/54) turbine on land east of Bemersley Road have been investigated using AutoTRACK computer software. The necessary geometry is defined by the manoeuvrability of the AIL's and as discussed above, a blade vehicle has been used in this instance to determine the required junction geometry.

5.2 Chapter Six discusses the route to be used by construction component AIL in accessing the proposed development site. The specified route arrives the site via Bemersley Green from the north. Figures 5.1 – 5.3 illustrate the AutoTRACK analysis of the manoeuvre from Bemersley Road into the proposed site access for blade, lower tower vehicles and crane. This illustrates junction geometry appropriate to cater for this turning movement by the required AIL.

5.3 Once the construction component has been delivered, the vehicle is shrunk in size to represent a standard articulated lorry, making the departure significantly less onerous in terms of vehicle swept path when compared with the arrival.

6. ACCESS ROUTE

6.1 Description of the Proposed Route

6.1.1 It is proposed that the construction components will be delivered from the M6 motorway, via the following route;

- A500;
- A527; and,
- Bemersley Road.

6.1.2 This route is illustrated in Figure 6.1 and described below.

6.1.3 The convoy will leave the M6 motorway at Junction 16 and head east on the A500. The A500 is of geometry such that no issues are evident in regard to transporting AILs. After approximately 4¼ miles the route will leave the A500, turning left onto the A527. As discussed above, in Section Two of this report, the A527 is constructed to a high standard, modern design whereby both link and junction geometry give no cause for concern in regard to transport of AIL.

6.1.4 Junctions on this route are typically large roundabout arrangements until the right turn onto Bemersley Road, which is a sharp right turn with a gradient change.

6.1.5 The route then continues paste the existing Waste and Recycling Centre, through Bemersley Green to the site.

6.2 A527 Tunstall Road to Bemersley Road

6.2.1 Figures 6.2 – 6.4 illustrate the above manoeuvre for blade vehicle, lower tower vehicle and crane, respectively and demonstrates that, subject to an over-sail on the footways of both Tunstall Road and Bemersley Road, this manoeuvre is achievable without any requirement for highway improvements.

6.3 Double Bends Between the Waste and Recycling Centre and Bemersley Green

6.3.1 Although the bends in Bemersley Road are relatively gentle, carriageway width is fairly constrained at this location and for that reason further investigation has been undertaken in order to confirm no constraint to passage by AIL.

6.3.2 Figures 6.5 – 6.7 illustrate the swept path for this manoeuvre and demonstrate that both sides of the carriageway are required by the AIL in order to pass through the double bends. This is easily controllable by convoy escort staff, although will require police presence in order to ensure the lawful Right to halt traffic. Traffic should be halted south of the proposed site access throughout this manoeuvre and enabling the convoy to pass into the site without delay or issue.

6.4 Bemersley Green

6.4.1 It will be appropriate to remove on-street parking from within the village of Bemersley Green to ensure ease of passage by the necessary AIL. Such a parking prohibition is not essential, although would significantly ease passage by the required convoys.

7. ISSUES

7.1 Introduction

7.1.1 The route described in Section Six, above, identifies a high standard route which is clearly appropriate to cater for transport of AIL to the point at which it turns from A527, onto Bemersley Road. From this point onwards the route justifies further investigation and in particular;

- the right turn from A527 (Tunstall Road) onto Bemersley Road; and,
- the gentle right-left double bend between the existing Waste and Recycling centre and Bemersley Green; and,
- passage through Bemersley Green.

7.1.2 Each of these locations is investigated above and described in further detail below.

7.2 A527 Tunstall Road to Bemersley Road

7.2.1 Although the analysis discussed in Paragraph 6.2.1 and illustrated in Figures 6.2 – 6.4 identifies that the above manoeuvre is achievable without any requirement for highway improvements, it is clear that, in order to ensure pedestrian safety convoy escort staff will be required to control use of the footways throughout this manoeuvre. In addition it will be necessary to hold back traffic on Bemersley Road on approach to the Tunstall Road junction in order to permit safely the AIL manoeuvre which will require use of both sides of the road on entering Bemersley Road.

7.3 Double Bends Between the Waste and Recycling Centre and Bemersley Green

7.3.1 The swept path illustrated in Figures 6.5 – 6.7 demonstrate that it will be necessary to hold back northbound traffic south of Bemersley Green whilst the AIL vehicles undertake this manoeuvre. Subject to careful traffic control, this manoeuvre is safely achievable.

7.4 Bemersley Green

7.4.1 Although the police have the power to instruct vehicles to be temporarily moved, many Police Authorities prefer to only use this power if backed up by a Traffic Regulation Order (TRO). It is recommended therefore that a temporary TRO is sought for Bemersley Road throughout the village of Bemersley for the duration of deliveries. This should prohibit on-street parking during appropriate hours (suggest 10:00 – 16:00) for the duration of programmed deliveries.

7.4.2 Given the short duration of these deliveries, the inconvenience to residents is controlled and should be acceptable. It is worthy of note, however, that TRO's are subject to public consultation and it is noted that failure of the TRO application will not necessarily preclude passage by the necessary AILs through Bemersley Green, although it will make that passage less simple to manage.

8. MITIGATION

8.1 Introduction

8.1.1 As demonstrated above, no physical mitigation is necessary in order to permit passage of the AIL convoys. It will be necessary, however, to control opposing traffic and parking at various locations and these are both discussed above and listed below. Further measures are appropriate in order to assist with managing traffic on and around the proposed delivery route throughout the period of the deliveries and these are also discussed below.

8.2 Specific Management Issues

8.2.1 Specific traffic management issues are discussed above and the following is proposed;

- Management of pedestrian use of the footways at the junction of Tunstall Road with Bemersley Road;
- Holding of traffic on Bemersley Road on the westbound approach to the junction with Tunstall Road;
- Holding of northbound traffic south of Bemersley Green; and,
- Temporary removal of parked vehicles in Bemersley Green.

8.3 General Management and Publicity

8.3.1 In order to further reduce impact of the proposed AIL movements, advance publicity should be used, by means of local television and radio bulletins, advertisements in local newspapers and leaflet drops. These should make residents aware of the planned convoy routes, transport dates and times and should recommend that journeys be re-timed or re-routed where possible in order to reduce conflict with the AIL convoys.

8.4 Conclusion

8.4.1 By a combination of raising awareness and localised traffic control, the necessary AIL convoys will be able to travel safely and successfully from the the M6 motorway to the site of the proposed wind turbine.

9. SUMMARY AND CONCLUSION

9.1 Summary

9.1.1 EDP propose to install a single wind turbine on under-utilised land east of Bemersley Road, Bemersley Green, near Stoke on Trent. Detail of the proposed turbine will be subject to commercial consideration following grant of planning permission, although for the purposes of considering the access and transport requirements, as example EWT DW52/54 turbine has been assumed. Such a turbine will require delivery by up to eight Abnormal Indivisible Loads. In addition, the erection of the turbine will require access to the construction site by rigid HGV in order to export excavated material and import hardcore and ready-mixed concrete for construction of the required foundations.

9.1.2 The construction period is anticipated to require access by the above vehicles for a total of around 7 days (5 days by HGV and up to 2 days by AIL).

9.1.3 In advance of the construction period, local publicity will encourage re-timing and/or re-routeing of necessary journeys, in order to reduce the potential for conflicting vehicle movements on the adjacent highway.

9.1.4 Construction traffic will be routed to and from the proposed construction site via the M6 motorway and thence A500, A527 and Bemersley Road.

9.1.5 There are no significant geometric constraints en route, although careful traffic management is appropriate at the following locations;

- Tunstall Road/Bemersley Road junction;
- Bemersley Road from the Waste and Recycling Centre to Bemersley Green;
- the village of Bemersley Green; and,

- at the proposed site access junction.

9.1.6 By means of localised traffic management, any impact caused by passage of the required AIL convoys can be maintained within reasonable bounds.

9.2 Conclusion

9.2.1 The above assessment demonstrates that any issues arising out of the proposed erection of a turbine at land east of Bemersley Road, Bemersley Green will be of only short duration and can be adequately mitigated by use of simple traffic management techniques described above. There is therefore no material reason for objection on highway grounds to this planning application.